Assignment 7

Fundamentals of Algebra; Factoring Polynomials

Textbook Assignment: Chapters 9, 10 (111-117)

7-1. The literal numbers a, x, and p are more general than the numbers 9, 8, and 7.

7-2. The commutative law for addition is illustrated by the equation
1. $ab = ba$
2. $a + a = b + b$
3. $a + b = b + a$
4. $a(b + c) = ab + ac$

7-3. The associative law of multiplication is illustrated by the equation
1. $abc = acb = cba$
2. $a \times (b + c) = c \times (b + a)$
3. $a (b + c + d) = ab + ac + ad$
4. $a \cdot (b \cdot c) = a \cdot b \cdot c = (a \cdot b) \cdot c$

7-4. If a = 2, b = -3, and c = 4, the algebraic sum of a - b - c equals
1. -5
2. 1
3. 3
4. 9

7-5. If r = 1, s = 3, t = 12, and x = 15, what is the value of the expression

$$t - \frac{2rx}{s}?$$

1. -3   3. 2
2. -2   4. 3

7-6. The algebraic expression

$$\frac{a + b - c \sqrt{ab}}{2}$$

is considered to be three numbers.

7-7. What is the value of the algebraic expression
$$5x^2 - 2xy + (3x)^2$$
when x = 2 and y = -3?
1. 44
2. 68
3. 124
4. 148

7-8. What name is given to the algebraic expression $ax - 2bx + cx^2 - 4$?
1. Monomial
2. Binomial
3. Trinomial
4. Polynomial

7-9. Which statement is true regarding the monomial 17xyz?
1. 17 is the coefficient of xyz.
2. 17x is the coefficient of yz.
3. 17xy is the coefficient of z.
4. Each of the above is a true statement.

7-10. In the expression xy, what is the coefficient of xy?
1. 1
2. x
3. y
4. x y

7-11. What is the coefficient of x^2y in the expression $x^2y - ab$?
1. 1
2. 2
3. x^2
4. y

7-12. Two terms of an expression are said to be like if they contain
1. at least one factor in common
2. the same numerical coefficient
3. the same literal factors with only their exponents different
4. the same literal factors raised to the same powers

7-13. The like terms in the expression
$2 ac^2 - 2bc^2 + ac^2 - 2c^2$ are
1. $2ac^2$ and $2bc^2$
2. $2ac^2$ and ac^2
3. $2ac^2$ and $2c^2$
4. $2bc^2$ and $2c^2$

7-14. What is the result when the expression

$$6x - 4x^2$$

is simplified?
1. $2x^2$
2. $2(1 - x)$
3. $2x(3 - 2x)$
4. $2x(x^2) - 3$

7-15. What is the correct procedure for combining the like terms $7cd^2$ and $-cd^2$?
1. Add -1 to 7 and use this sum as the coefficient of cd^2.
2. Subtract -1 from 7 and use this difference as the coefficient of cd^2.
3. Add 1 to 7 and use this sum as the coefficient of $-cd^2$.
4. Add -1 to 7 and use this sum as the coefficient of $-cd^2$.

7-16. Which of the following expressions are equivalent, if any?
A. $6x - (x - y + 4)$
B. $6x - [x - y + 4]$
C. $6x - \{x - y + 4\}$
D. $6x - \overline{x - y + 4}$
1. A and B only are equivalent.
2. A, B, and C only are equivalent.
3. All are equivalent.
4. None are equivalent.

7-17. After the removal of parentheses, the expression $6 - (-x + y - z)$ becomes
1. $6 + x + y - z$
2. $6 - x + y + z$
3. $6 + x - y + z$
4. $6 - x - y + z$

7-18. What is the result of removing parentheses and brackets from the expression

$$(x - y) - [5x - (4 - 8x)]?$$

1. $-4 + 4x - y$
2. $-4 + 14x - y$
3. $4 - 12x - y$
4. $4 - 14x + y$

7-19. If an expression in parentheses is preceded by a minus sign, what happens to the signs of its terms when the parentheses are removed?
1. The signs remain unchanged.
2. The plus signs are changed to minus signs and the minus signs are left unchanged.
3. The minus signs are changed to plus signs and the plus signs are left unchanged.
4. The plus signs are changed to minus signs and the minus signs are changed to plus signs.

7-20. Which of the following expressions is equivalent to the expression

$$8x - y - 7 + 14x?$$

1. $(8x - y) - (7 + 14x)$
2. $(8x - y) - (7 - 14x)$
3. $-(8x - y) + (7 - 14x)$
4. $-(8x - y) + (7 + 14x)$

7-21. When the polynomial $6x - z - y + 4$ is grouped by enclosing the first two terms in parentheses preceded by a minus sign, and the last two terms in parentheses preceded by a plus sign, what is its appearance?
1. $-(6x - z) + (y + 4)$
2. $-(-6x + z) + (-y + 4)$
3. $-(-6x - z) + (-y - 4)$
4. $-(-6x + z) + (y - 4)$

7-22. The product of x^y and x^z is

1. x^{yz} 3. $x^{(y + z)}$

2. $2x^{yz}$ 4. $2x^{(y + z)}$

7-23. What is the product of $7r^3st^2$ and $5rs^2t^3$?

1. $12r^2s^3t$ 3. $35r^2st$

2. $12r^4st^5$ 4. $35r^4s^3t^5$

7-24. If two monomials contain a common literal factor and one monomial is divided by the other, the common literal factor in the quotient will have an exponent that is equal to the
1. sum of the exponents of the factor in the two monomials
2. product of the exponents of the factor in the two monomials
3. exponent of the factor in the numerator minus the exponent of the factor in the denominator
4. exponent of the factor in the numerator divided by the exponent of the factor in the denominator

7-25. The product of $6a^2b$ and $14a^3b^2$ is

1. $20a^6b^2$ 3. $84a^5b^3$

2. $20a^5b^3$ 4. $84a^6b^2$

7-26. The quotient resulting from dividing

$$16x^2y^3z \text{ by } (-8x^3y^2z) \text{ is}$$

1. $-2xy$ 3. $-2x^{-1}y$

2. $2x^{-1}y$ 4. $-2xyz^0$

7-27. What is the sum of $11p - 7q - r$,
$3p + q - 9r$, and $-p - q + 2r$?
1. $13p - 9q + r$
2. $13p - 7q - 8r$
3. $14p + q - 6r$
4. $14p - q + 10r$

7-28. What is the result of subtracting
$-3r - s + 6t$ from $5r + 2s - t$?
1. $2r - s - 7t$
2. $2r + s + 5t$
3. $8r + s - 5t$
4. $8r + 3s - 7t$

7-29. What is the result when the expression

$$(3x - 2y + 4) - (-6x + y - 5)$$

is simplified?
1. $-3x - y - 1$
2. $-3x - y + 1$
3. $9x - y - 1$
4. $9x - 3y + 9$

7-30. What is the product when $(-4y + x - 7)$
is multiplied by x?
1. $4xy + x^2 - 7x$
2. $-4xy + x^2 + 7x$
3. $4xy - x^2 + 7x$
4. $-4xy + x^2 - 7x$

7-31. What is the product of

$$(p - q) \text{ and } (r - s - t)?$$

1. $pr - ps - pt - qr + qs + qt$
2. $pr - ps + pt - qr + qs - qt$
3. $pr + ps - pt + qr - qs - qt$
4. $pr + ps + pt + qr + qs - qt$

7-32. What is the result of multiplying

$$(5v - 7) \text{ by } (2v + 9)?$$

1. $10v^2 + 31v - 63$
2. $10v^2 + 31v + 2$
3. $10v^2 - 31v + 63$
4. $10v^2 + 59v + 63$

7-33. What is the product when $9x^2 - 6x + 1$
is multiplied by $3x + 2$?
1. $27x^3 - 36x^2 + 15x - 2$
2. $27x^3 - 36x^2 - 15x + 2$
3. $27x^3 - 9x - 2$
4. $27x^3 - 9x + 2$

7-34. The product

$$(x + y)(x + y) = x^2 + 2xy + y^2$$

is called the product of the sum and
difference of two numbers.

7-35. The product of $(x + 3)(x - 4)$ is
$x^2 - x - 12$.

7-36. The product of $x^4 - y^4$ and $x^4 + y^4$ is

1. $x^8 - y^8$ 3. $x^8 - 2x^4y^4 + y^8$

2. $x^{16} - y^{16}$ 4. $x^{16} - 2x^4y^4 + y^{16}$

7-37. The denominator of the fraction

$$\frac{x}{y - \sqrt{z}}$$

can be rationalized by
1. multiplying both the numerator and
denominator by $y + \sqrt{z}$
2. multiplying both the numerator and
denominator by $y - \sqrt{z}$
3. multiplying both the numerator and
denominator by $\sqrt{z} - y$
4. squaring both the numerator and
denominator

7-38. Rationalizing the binomial denominator of
which of the following fractions results
in the fraction equaling $8\sqrt{5} - 16$?

1. $\dfrac{8}{\sqrt{5} - 2}$ 3. $\dfrac{8}{\sqrt{2} + 5}$

2. $\dfrac{8}{\sqrt{2} - 5}$ 4. $\dfrac{8}{\sqrt{5} + 2}$

7-39. Which of the following statements is true
of the square of the difference of two
numbers but not of the square of the sum
of the same numbers?
1. There is no middle term.
2. The sign of the middle term is
negative.
3. The middle term is equal to the prod-
uct of the numbers.
4. The middle term is four times the
product of the numbers.

7-40. Why is the product of the sum and the
difference of two numbers considered a
special product?
1. The middle term is always irrational.
2. The sign of the middle term is always
negative.
3. The value of the first term is always
equal to the middle term.
4. The product can be written without
going through the whole multiplica-
tion process.

7-41. The square of $(6 - \sqrt{3})$ is

1. 9 3. $36 - 10\sqrt{3}$

2. $24 - 12\sqrt{3}$ 4. $39 - 12\sqrt{3}$

7-42. Both $(6x + 8 - y) \div 6$ and $6 \div (6x + 8 - y)$ may be solved by the distributive method.

7-43. What is the result of dividing

$$27x^4y^4z^4 + 9x^2y^4z^6 - 12x^3yz$$

by $3x^2yz$?

1. $9x^4yz + 3yz - 4xyz$
2. $9xy^2z^2 + 3y^2z^4 - 4x$
3. $9x^2y^3z^3 + 3y^3z^5 - 4x$
4. $9x^3y^3z^3 + 3y^3z^4 - 4xy$

7-44. Which of the following factors is a monomial factor of

$$p^2qr^3 - pr^2s + pq^2rs^3?$$

1. pr 3. p^2r

2. qr^2 4. pqs^3

7-45. What is the numerical coefficient of the xy term in the expression obtained by dividing

$$2x^3 + 5x^2y + xy^2 - 8y^3 \text{ by } x - y?$$

1. 2   3. 7

2. 5   4. 8

7-46. Division of

$$6x^4 - 28x^3 + 19x^2 - 14x - 1 \text{ by } 3x - 2$$

leaves a remainder of

1. 0   3. $\dfrac{-2}{3x - 2}$

2. $\dfrac{-1}{3x - 2}$ 4. $\dfrac{-9}{3x - 2}$

7-47. The polynomial $4 - 6x^3 + 8x - x^2$ arranged in the order of descending powers of x is
1. $4 + 8x - x^2 - 6x^3$
2. $-6x^3 + 8x - x^2 - 4$
3. $-6x^3 - x^2 + 8x + 4$
4. $8x + 4 - (6x^3 + x^2)$

7-48. What is the quotient when

$$x^3 - 8x^2 + 16x - 5 \text{ is divided by } x - 5?$$
1. $x^2 - x + 5$
2. $x^2 - 3x + 2$
3. $x^2 - 3x + 1$
4. $x^2 + 13x - 49 + \dfrac{240}{(x - 5)}$

7-49. The division problem

$$
\begin{array}{r}
x^2 - 3x + 4 \\
x - 2 \overline{\smash{\big)}\; x^3 - 5x^2 + 10x - 8} \\
\underline{x^3 - 2x^2} \\
-3x^2 + 10x \\
\underline{-3x^2 + 6x} \\
4x - 8 \\
\underline{4x - 8}
\end{array}
$$

can be condensed to which of the following?

1.
$$
\begin{array}{r}
x^2 - 3x + 4 \\
x - 2 \overline{\smash{\big)}\; x^3 - 5x^2 + 10x - 8} \\
\underline{- 2x^2 - 6x + 8} \\
3x^2 + 4x \quad 0
\end{array}
$$

2.
$$
\begin{array}{r}
x^2 - 3x + 4 \\
x - 2 \overline{\smash{\big)}\; x^3 - 5x^2 + 10x - 8} \\
\underline{- 2x^2 - 6x - 8} \\
- 3x^2 + 4x \quad 0
\end{array}
$$

3.
$$
\begin{array}{r}
x^2 - 3x + 4 \\
x - 2 \overline{\smash{\big)}\; x^3 - 5x^2 + 10x - 8} \\
\underline{- 2x^2 + 6x - 8} \\
- 3x^2 + 4x \quad 0
\end{array}
$$

4.
$$
\begin{array}{r}
x^2 - 3x + 4 \\
x - 2 \overline{\smash{\big)}\; x^3 - 5x^2 + 10x - 8} \\
\underline{x^3 - 3x + 4x - 8}
\end{array}
$$

7-50. The division problem in item 7-49 can be further condensed to

1.
$$
\begin{array}{r}
1 - 3 \quad 4 \\
-2 \overline{\smash{\big)}\; 1 - 5 \quad 10 - 8} \\
\underline{- 2 \quad -6 - 8} \\
1 - 3 \quad 4 \quad 0
\end{array}
$$

2.
$$
\begin{array}{r}
1 - 3 \quad 4 \\
-2 \overline{\smash{\big)}\; 1 - 5 \quad 10 - 8} \\
\underline{- 2 \quad -6 \quad 8} \\
1 \quad 3 \quad 4 \quad 0
\end{array}
$$

3.
$$
\begin{array}{r}
1 - 3 \quad 4 \\
-2 \overline{\smash{\big)}\; 1 - 5 \quad 10 - 8} \\
\underline{- 2 \quad 6 - 8} \\
1 - 3 \quad 4 \quad 0
\end{array}
$$

4.
$$
\begin{array}{r}
1 - 3 \quad 4 \\
-2 \overline{\smash{\big)}\; 1 - 5 \quad 10 - 8} \\
\underline{1 - 3 \quad 4 - 8}
\end{array}
$$

7-51. If $2x^5 - 6x^4 + 8x$ is divided by $x - 7$, the results of each successive step of multiplication and subtraction are determined by the
1. x's
2. 2, -6, and 8
3. 2, -6, 8, and -7
4. 2, -6, 8, and the x's

7-52. Synthetic division is limited to divisors of the form x - a and x^2 - a.

7-53. The division of x^3 - $5x^2$ + 11x - 15 by x - 3 using synthetic division becomes

$$-3 \, \underline{\begin{array}{|cccc} 1 - 5 & 11 - 15 \\ - 3 & 6 - 15 \\ \hline 1 - 2 & 5 \quad 0 \end{array}}$$

7-54. In the form

$$2 \, \underline{\begin{array}{|cccc} 3 - 4 & 1 & 6 \\ 6 - 20 & 42 \\ \hline 3 - 10 & 21 - 36 \end{array}}$$

the result of dividing $3x^3$ - $4x^2$ + x + 6 by x + 2 is
1. $3x^2$ - 4x + 1 + $\dfrac{6}{x + 2}$

2. $3x^2$ - 10x + 21 - $\dfrac{36}{x + 2}$

3. $6x^2$ - 20x + 42 + $\dfrac{6}{x + 2}$

4. $6x^2$ - 20x + 42 - $\dfrac{36}{x + 2}$

7-55. The prime factors of x^2 - 16 are x + 4 and x - 4.

7-56. The prime factors of x^3 - 9x are
1. x^3, -9x
2. x, x^2 - 9
3. x, -3, +3
4. x, x - 3, x + 3

7-57. Express the polynomial

$5x^2y$ - 10xy + $25xy^2$ as a product of

prime factors.

1. $5x^2y^2(1 - 2x^{-2}y^{-2} + 5)$
2. $y(5x^2 - 10x + 25xy)$
3. $x(5xy - 10y + 5y^2)$
4. $5xy(x - 2 + 5y)$

7-58. Factor $2y^{r+s}$ - $4y^r$ into prime factors.

1. $2(y^{r+s} - 2y^r)$ 3. $2y^{r+s} - 4y^r$

2. $2y(y^s - 2y^r)$ 4. $2y^r(y^s - 2)$

7-59. The algebraic form ab + ac - xb - xc is equivalent to the form (a - x)(b + c).

7-60. What are the factors of 4x - 2y + xy - 8?
1. (4 - y)(x + 2)
2. (y - 4)(x + 2)
3. (y + 4)(2 - x)
4. (y + 4)(x - 2)

7-61. What is the factored form of

$$98x^3 - 32xy^2?$$
1. 2(7x + 4y)(7x - 4y)
2. 4(7x + 2y)(7x - 2y)
3. 2x(7x + 4y) (7x - 4y)
4. 4x(7x + 2y)(7x - 2y)

7-62. What are the factors of the expression

$$2a^3b - 8ab^3?$$

1. 2ab(2b - a)(2b + a)
2. 2ab(a - 2b)(a + 2b)
3. $2a^2b^2$(a - b)(a + b)
4. $2a^2b$(a - 2b)(a + 2b)

7-63. What are the prime factors of $81x^4$ - 1?
1. $(9x^2 + 1)(9x^2 + 1)$
2. $(9x^2 - 1)(3x + 1)(3x + 1)$
3. $(3x - 1)(3x + 1)(9x^2 + 1)$
4. (3x - 1)(3x + 1)(3x + 1)(3x + 1)

7-64. What are the factors of $8a^3$ - 1?
1. $(2a + 1)(4a^2 + 2a + 1)$
2. $(2a + 1)(4a^2 - 2a + 1)$
3. $(2a - 1)(4a^2 - 2a + 1)$
4. $(2a - 1)(4a^2 + 2a + 1)$

7-65. Which of the following trinomials is a perfect square?
1. $36t^2 + 9s^2 - 9st$
2. $36t^2 + 9s^2 - 18st$
3. $36t^2 + 9s^2 + 18st$
4. $36t^2 + 9s^2 - 36st$

7-66. In order for the incomplete trinomial

$$16x^2 + 25y^2 + ?$$

to be a trinomial square, the missing term must be
1. ±400xy
2. ±$400x^2y^2$
3. ±20xy
4. ±40xy

7-67. Assume that a trinomial can be factored into two binomials that have a common term. The unlike terms will be opposite in sign and the positive one will be numerically smaller than the negative one only if the
1. second and third terms of the trinomial are both positive
2. second and third terms of the trinomial are both negative
3. second term of the trinomial is positive and the third term is negative
4. second term of the trinomial is negative and the third term is positive

7-68. What are the factors of $x^2 - x - 20$?
1. $(x - 4)(x - 5)$
2. $(x - 4)(x + 5)$
3. $(x - 5)(x + 4)$
4. $(x - 21)(x + 1)$

7-69. What are the factors of $x^2 - x + 30$?
1. $(x - 6)(x + 5)$
2. $(x - 6)(x - 5)$
3. $(x + 6)(x - 5)$
4. It cannot be factored.

7-70. What are the factors of $y^2 + 48y - 100$?
1. $(y - 50)(y - 2)$
2. $(y - 50)(y + 2)$
3. $(y + 50)(y - 2)$
4. It cannot be factored.

7-71. What are the factors of the trinomial expression

$$6m^2 - 13m + 6?$$

1. $(3m + 2)(2m + 3)$
2. $(3m - 2)(2m + 3)$
3. $(3m - 2)(2m - 3)$
4. It cannot be factored.

7-72. A fraction can be reduced to lower terms only if the
1. numerator is greater than the denominator
2. denominator is greater than the numerator
3. numerator and denominator both contain numerical factors
4. numerator and denominator contain common factors

7-73. Which of the following fractions takes the form

$$\frac{2a}{7x^2z^2}$$

after it has been reduced to its lowest terms?

1. $\dfrac{12a^2xz}{42ax^3z^3}$ 　 3. $\dfrac{36a^2x^2z}{49axz^3}$

2. $\dfrac{12a^2x}{49x^2z}$ 　 4. $\dfrac{36ax^3z^2}{56a^2x^5z^4}$

7-74. What is the result when the fraction

$$\frac{y^2 - 9}{y^2 + 6y + 9}$$

is reduced to its lowest terms?

1. $\dfrac{-1}{6y}$ 　 3. $\dfrac{y - 3}{y + 3}$

2. $\dfrac{y + 3}{y - 3}$ 　 4. It cannot be reduced.

7-75. What is the product when

$$\frac{2m^2 - 5m - 12}{2m + m^3 + 3m^2}$$

is multiplied by

$$\frac{m^2 + m}{7m - 3 + 6m^2} ?$$

1. $\dfrac{m(m - 4)}{(3m - 1)(m + 2)}$

2. $\dfrac{(m - 4)}{(3m - 1)(m + 2)}$

3. $\dfrac{m + 1}{(3m - 1)(m - 2)}$

4. $\dfrac{m(m + 1)}{(3m - 1)(m + 2)}$